HEADING GENERATION METHOD AND SYSTEM OF UNMANNED AERIAL VEHICLE

BACKGROUND OF THE INVENTION

[0001] The present invention relates to the field of unmanned aerial vehicles, and in particular, to a heading generation method and system of an unmanned aerial vehicle.

[0002] In aerial photography missions, what plays a key role in the aerial photography is selecting a point of view. Like the traditional photographing and video recording, the location and angle of a point of view as well as shooting parameters decide the quality and artistry of the shots to a great extent. In the traditional fixed-point photographing and video recording, a photographer can easily adjust a video camera at a fixed location. Shooting is carried out until he/she finds a satisfactory point of view and parameters. When the shot is taken, it can be moved on to the next scene. Shooting and determining the point of view in one scene do not interfere with another scene. Different from the traditional photographing and video recording, in aerial shooting, the video camera is not static but in a continuous real-time moving state, in which both the point of view and parameters at any time of the flight are needed to be accurate. It is more difficult to ensure such accuracy than in the traditional fixed-point photographing and video recording, because the photographer has no chance of repeatedly adjusting the point of view and making comparison of the views after the flight begins. The flight has to be completed in one take once it has begun, unless post-editing is conducted when the flight route is navigated multiple times. How a task of continuous shooting a plurality of target objects or scenes is completed and how an aircraft with its onboard aerial photography apparatus completes high quality shooting quickly involve flight trajectory planning of the aerial photography aircraft. That is, it is a flight route generation problem for aerial photography.

[0003] There are two kinds of existing flight route generation methods for aerial photography. In one method, an optimal flight route is directly selected from multiple test flights carried out by a flight operator by comparing the test flights. On-site control of the flight operator is relied on during shooting. In the other method, a target flight route is generated by first setting target waypoints and shooting angles on a map, and then, through manual operations or computer control, having the aircraft completing the flight over the target waypoints according to a certain order.

[0004] For the first flight route generation method for aerial photography, since it is difficult for the operator's operation to achieve a precise and perfect effect all the time, the flight operator will need to carry out shooting around a target object or scene in multiple flights. This not only increases the time of flight operation and the cost of employing the flight operator, but also makes it difficult to ensure the quality of shooting. An especially skilled pilot can control the flight route precisely, but such an operator is very rare, and, at the same time, it is also difficult to have a professional photographer efficiently cooperate and communicate with the pilot. For the second method, although dependence on the pilot is reduced, setting waypoints on the map manually could lead to some blind spots simply because it is impossible to get what you see on the map. The manually-set waypoints cannot guarantee the optimal shooting distance and angle, and cannot guarantee the high efficiency of continuous shooting. If an object not marked on the map is present, for example, a tree or a new building, the manner of planning a flight route on the map may bring about a potential safety hazard. For example, the aircraft could crash into the building during an actual flight.

BRIEF SUMMARY OF THE INVENTION

[0005] A technical problem to be mainly solved in the present invention is to provide a heading generation method and system of an unmanned aerial vehicle, which can replace manual real-time precise control over the aircraft at a shooting site to greatly shorten the time of man-made flight operation and avoid influences of human factors on the quality of aerial photography. At the same time, the heading generation method and system of an unmanned aerial vehicle can avoid the blindness caused by setting waypoints on the map, thus guaranteeing the optimal shooting angle and distance and ensuring that the aircraft and its onboard apparatus can rapidly and efficiently complete high-quality aerial photography assignments.

[0006] To solve the foregoing technical problem, a technical solution adopted in the present invention is as follows: a heading generation method of an unmanned aerial vehicle is provided, including the following steps of: making a preliminary flight for selecting a point of view to receive and record flight waypoints of the unmanned aerial vehicle, the waypoints including positioning data and flight altitude information of the unmanned aerial vehicle; generating a flight trajectory according to waypoints of the preliminary flight; editing the flight trajectory to obtain a new flight trajectory; and transmitting the edited new flight trajectory to the unmanned aerial vehicle to cause the unmanned aerial vehicle to fly according to the new flight trajectory.

[0007] The method further includes a step of: editing attitude information of an imaging device, and transmitting the edited attitude information of the imaging device to the unmanned aerial vehicle to cause the imaging device to take a photograph according to an edited attitude.

[0008] The unmanned aerial vehicle is provided thereon with a gimbal, which includes at least one turning shaft. The imaging device is disposed on the gimbal and is rotatable with rotation of the gimbal, and the editing attitude information of an imaging device is editing a rotation angle of the at least one turning shaft of the gimbal.

[0009] The method further includes a step of: editing a shooting parameter of an imaging device, and transmitting the edited shooting parameter of the imaging device to the unmanned aerial vehicle to cause the imaging device to take a photograph according to the edited shooting parameter.

[0010] The flight trajectory of the unmanned aerial vehicle is positioned by smoothly transitioning collected discrete point data to form a smooth curve.

[0011] The flight trajectory of the unmanned aerial vehicle is positioned as a line through respective sampling points.

[0012] The method further includes a step of: recording image information of an image captured by an imaging device, displaying, in combination with a map, positioning data, and flight altitude information of the unmanned aerial vehicle at one point of the trajectory, attitude information of the imaging device, and an image captured by the imaging device corresponding to the point, and editing the new flight trajectory.

[0013] The flight trajectory includes a plurality of nodes corresponding to positions where the unmanned aerial